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## **6.0 ECONOMIC EVALUATION**

This section assesses the economic impacts of the alternatives presented in this document. Additional economic and social considerations and information are discussed in Chapters 3, 4, 7, 8, and 9 of this document.

### **6.1 Number of Fishing and Dealer Permit Holders**

In order to examine the baseline universe of entities potentially affected by the preferred alternatives, NMFS analyzed the number of permits that were issued as of February 2006 in conjunction with HMS fishing activities. This analysis of the permits issued is detailed further in Section 3.9 and summarized here.

#### **6.1.1 HMS Commercial Fishing Permits**

The program implemented in the 1999 Tunas, Swordfish, and Shark FMP set up six different limited access permit types: 1) directed swordfish, 2) incidental swordfish, 3) swordfish handgear, 4) directed shark, 5) incidental shark, and 6) tuna longline. These permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit. Similarly, the tuna longline permit is valid only if the permit holder also holds both a limited access swordfish (directed or incidental, not handgear) and a shark permit. Swordfish handgear and shark permits are valid without another limited access permit. As of February 2006, there were 1,131 total HMS commercial fishing permits (191 directed swordfish, 86 incidental swordfish, 88 handgear, 240 directed shark, 312 incidental shark, and 214 tuna longline). However, there are only a total of 604 permit holders, since permit holders may have more than one type of permit. A detailed break down of the shark, swordfish, and tuna longline limited access permits by category and state is provided in Table 3.92. In addition to the 214 tuna longline permits, there are also 40 harpoon, seven trap, 4,824 general, and five purse seine Atlantic tuna permit holders as of February 2006. The HMS CHB permits, which are commercial permits for Atlantic tunas, are discussed below in the recreational permit section.

#### **6.1.2 Dealer Permits**

Dealer permits are required for any person that receives, purchases, trades for, or barter Atlantic tuna, swordfish, and sharks, from a fishing vessel of the United States or, in the case of tunas and swordfish, imports or exports regardless of ocean of origin. There were 285 Atlantic swordfish, 336 Atlantic shark, and 416 Atlantic tunas dealer permit holders as of February 2006. The geographic distribution of these dealer permit holders is detailed in Table 3.95.

#### **6.1.3 HMS Recreational Permits**

There are two types of permits issued with activities associated with HMS recreational fishing activity. The HMS Angling category permit is required for any angler that is fishing for Atlantic HMS; fish caught using this permit cannot be sold. As of February 2006, there were 25,238 HMS Angling category permit holders. The HMS CHB permit allows for the sale of Atlantic tunas and allows CHB vessels to catch and land sharks, swordfish, and billfish pursuant

to the recreational regulations (*i.e.*, no sale of fish). The CHB permit holder may also holds a swordfish handgear and/or shark limited access permit that allows for the sale of those species under the regulations for those permits. As of February 2006, there were 4,173 HMS CHB permit holders.

Since 1999, Federal regulations have required that each HMS tournament operator register their tournaments with the NMFS at least four weeks prior to the commencement of tournament fishing activities. In 2005, 256 HMS tournaments registered where as in 2004 just 215 tournaments registered. Tournament operations are variable from year to year. Section 3.9 provides more detailed information on HMS tournaments including a detailed geographic breakdown of registered HMS tournaments.

## 6.2 Gross Revenues of Fishermen

Table 6.1 summarizes the 2004 average annual revenues of the Atlantic HMS fisheries based on average ex-vessel prices and the weight reported landed as per the United States National Report (NMFS, 2005), information given to ICCAT (Cortes, 2005), and price and weight information reported to the NMFS Northeast Regional Office by Atlantic bluefin tuna dealers. Section 3.5 provides further detail regarding annual revenues, including historical numbers. The overall gross revenues generated from the HMS fishery totaled \$43.9 million in 2004. The largest portion came from swordfish, generating \$15.4 million in gross revenues (35 percent).

The highest average ex-vessel price per lb dw across all regions in the Atlantic HMS fishery was \$7.86 for bluefin tuna. In addition, average ex-vessel price for shark fins, all grades combined, was approximately \$16.25 per lb in 2004.

**Table 6.1 Estimates of the total ex-vessel annual revenues of Atlantic HMS fisheries.** Sources: NMFS 2005a; Cortes, 2005; and bluefin tuna dealer reports from the Northeast Regional Office.

Species	2004		
	Ex-Vessel Price (\$/lb dw)	Weight (lb dw)	Revenue
Bigeye tuna	\$4.10	551,503	\$2,258,404
Bluefin tuna	\$7.86	885,720	\$6,961,760
Yellowfin tuna	\$2.48	4,832,483	\$11,972,477
Other tunas*	\$0.74	287,127	\$211,756
Swordfish**	\$3.57	4,317,369	\$15,391,422
Large coastal sharks	\$0.86	3,206,377	\$2,757,484
Pelagic sharks	\$1.12	450,833	\$504,933
Small coastal sharks	\$0.50	677,305	\$338,653
Shark fins (weight = 5% of all sharks landed)	\$16.25	216,726	\$3,521,793
<b>Total HMS</b>		<b>15,425,443</b>	<b>\$43,918,682</b>

Note: Average ex-vessel prices may have some weighting errors, except for bluefin tuna which is based on a fleet-wide average.

\* Other tunas include skipjack and albacore.

\*\* Swordfish weight estimates do not include dead discards.

### 6.3 Variable Costs and Net Revenues

In 2003, NMFS initiated mandatory cost-earnings reporting for selected vessels to improve the economic data available for all HMS fisheries. In the past, most of the studies regarding pelagic longline variable costs and net revenues available to NMFS analyzed dated data from 1996 and 1997. An analysis of the 2004 cost-earnings data is incorporated below. Where noted, NMFS has converted 1996 and 1997 dollars to 2004 dollars using the consumer price index provided by the Bureau of Labor Statistics.

Larkin *et al.* (2000) examined 1996 logbooks and the 1996 voluntary economic forms and found that net returns to a vessel owner varied substantially depending on the vessel size and the fishing behavior (*i.e.*, sets per trip, fishing location, season, target species). They found that out of 3,255 pelagic longline trips reported in 1996, 642 pelagic longline trips provided the voluntary economic information. Larkin *et al.* (2000) suggest using median values (half of the fleet is less than this value and half is above) instead of mean values (the average of all vessels) given the high degree of skewness to the data. For example, the mean owner's share of a trip is \$4,412, while the median is \$2,242. Larkin *et al.* (2000) suggest that the median values identify the characteristics of the majority of the fleet better than the mean, which can be influenced by outliers (a few vessels that may not be similar to the rest of the fleet). The mean supply costs per trip for the vessels sampled was \$5,959 and median was \$3,666. This changed depending on area fished, with the median ranging from \$1,928 in the area between North Carolina and the east coast of Florida (FEC to MAB) and \$10,100 in the Caribbean. Vessels in the NED area (Maine to Virginia region in Larkin *et al.* (2000)) had a median supply cost per trip of \$2,831 or \$3,408 in 2004 dollars. For the entire fleet, Larkin *et al.* (2000) found that the average net revenues per vessel per trip was \$7,354 (\$8,854 in 2004 dollars). Vessels fishing in the Caribbean and Maine to Virginia areas had the largest average net returns to the vessel owner per trip at \$12,188 and \$6,672, respectively (\$14,674 and \$8,033, respectively, in 2004 dollars). Generally, Larkin *et al.* (2000) found that vessels between 46 and 64 feet in length that had between 10 and 21 sets per trip, fished in the second quarter, fished in the Caribbean, or had more than 75 percent of their gross revenues from swordfish had the highest net return to the owner (ranging from \$3,187 to \$13,097 per trip) while vessels less than 45 feet in length that had between one and three sets per trip, fished in the first quarter, fished between North Carolina and Miami, Florida, or had between 25 and 50 percent of their gross revenues from swordfish had the lowest net return to the owner (ranging from \$642 to \$1,885 per trip).

Porter *et al.* (2001) conducted a survey of 147 vessels along the Atlantic and Gulf of Mexico (110 surveys were completed) in 1998 regarding 1997 operations. Survey information was combined with trip tickets and logbook data. They found that on average, vessels received approximately \$250,000 annual gross revenues, annual variable costs were approximately \$190,000, and annual fixed costs were approximately \$50,000. Thus, vessels were left with approximately \$8,000 to cover depreciation on the vessel and the vessel owner lost approximately \$3,500 per year. On a per trip level, gross revenues averaged \$22,000 and trip expenses, including labor, were \$16,000. Labor cost the owner the most (43 percent), followed by gear. Generally, trip returns were divided so the vessel owner received 43 percent and the captain and crew 57 percent. Porter *et al.* (2001) noted that 1997 was probably a financially poor year due to a reduction in swordfish quota and a subsequent closure of the fishery (this fishery

has not been closed since). Similar to Larkin *et al.* (2000), Porter *et al.* (2001) noted differences between region, vessel size, and target species. While all vessels had an average net return per trip of \$5,556 (\$6,539 in 2004 dollars), vessels that fished in the New England or Caribbean regions had much higher net returns per trip at \$20,772 and \$18,940, respectively (\$24,448 and \$22,291, respectively in 2004 dollars).

In general, both Larkin *et al.* (2000) and Porter *et al.* (2001) found that the average net return to a vessel is fairly low after all variable costs including labor were accounted for. This was true even of vessels fishing in the northeast region or Caribbean (*i.e.*, regions with relatively high gross revenues). This corresponds with the results of Ward and Hanson (1999) who found that fifty percent of the fleet earns \$10,000 or less annually and that, each year, 20 percent of the fleet actually has a loss. Additionally, as suggested by Larkin *et al.* (2000) in their discussion of mean versus median values, Ward and Hanson (1999) found there were a number of vessels that earned much higher net revenues than the average vessel with 19 percent of the fleet earning \$50,000 or more annually and seven percent earning more than \$100,000 annually.

An analysis of the 2004 HMS logbook cost-earnings data provides updated information regarding the costs and revenue of a cross section of vessels operating in the HMS fisheries. The data contains a total of 579 trips taken by 51 different vessels. For reasons mentioned above, median values are reported. Median gross revenues per trip for 2004 were approximately \$12,112. Median total costs per trip were \$4,345 (compared to \$3,320 in the Larkin *et al.* (2000) study), with fuel costs making up \$567 (13 percent) of those costs. Median net revenue in this sample was \$6,728 per trip (compared to \$8,624 in the Larkin *et al.* (2000) study). The typical trip was nine days long and involved six sets. The median number of crew was three and the average share paid to crew was 11 percent of net revenue (\$740 per trip). The captain share of net revenue was 20 percent (\$1,346) and the owner share was reported to be 50 percent (\$3,364). The 2004 cost earnings information is similar to the findings of the 1996 study, but gross revenues appear to be lower than the Porter *et al.* (2001) study of 1997 operations.

## **6.4 Expected Economic Impacts of the Alternatives**

### **6.4.1 Bycatch Reduction**

#### **6.4.1.1 Workshops**

NMFS considered six alternatives (A1-A6) for workshops focusing on protected species release, disentanglement, and identification workshops for pelagic longline, bottom longline, and gillnet fishermen. In addition, ten alternatives (A7-A16) were considered for HMS species identification workshops.

The economic impacts of the various workshop alternatives primarily focuses on the opportunity costs associated with fishermen attending workshops. Opportunity cost is the cost of passing up the next best choice when making a decision. In this document, NMFS assumes that for fishermen who may have to attend workshops, the next best choice of using their time in terms of a business activity would likely be fishing or fishing related activities (*e.g.*, ensuring

vessel and equipment are in working order, completing logbook requirements, preparation for the next fishing trip, etc.). Other opportunities exist (*e.g.*, attending family events or other jobs); however, NMFS feels this assumption is reasonable given that fishing is often the most valuable activity engaged in by most fishermen. In order to estimate the value of their opportunity cost, NMFS assumed that fishermen would lose a day of fishing rather than a day of fishing related activities, and conducted an analysis of HMS logbook cost-earnings data to estimate daily earnings per day at sea for individual HMS fishery participants.

These estimates of opportunity cost per day at sea, along with additional estimates that follow, are likely to be high since they do not take into consideration the time the owners, operators (*i.e.*, captains), and crew spend on fishing related activities, such as preparing for a trip at the dock and the time it takes to offload and other activities that occur at the dock, that require labor time. Therefore, the estimates provided are likely to overestimate opportunity costs since crew share per day is estimated here by dividing a fisherman's share per trip by the number of days at sea, and not by the total number of days worked to earn their share since the Agency lacks this information. For example, if crew members earn \$740 per trip and each trip is 9 days long at sea, the result would be an average of \$82 per day in earnings. However, it is likely the crew actually worked for three days before the trip and one day after the trip preparing and offloading so their actual earnings per day worked would only be \$62 per day.

Also, note that owners incur costs outside of costs directly associated with a trip, such as capital costs, that reduce their earnings/profit. The revenue share to owner per day at sea might not accurately reflect an owner's true opportunity cost and is likely to be overestimated. For example, insurance costs and capital equipment costs are not reflected in the estimated revenue share for owners, but if they were true earnings would be lower. This is even more evident when owners own multiple vessels. In addition, an owner's participation in a workshop may not disrupt their vessel's ability to go out fishing depending on the owner's roll in vessel operations.

Alternative A1 considers continuing voluntary workshops for longline fishermen. This alternative may result in some negative short-term economic impacts related to workshop travel costs and lost fishing time that may be incurred by fishery participants who choose to attend. Poor attendance at voluntary workshops due to competing demands for fishermen's time, however, may result in insufficient improvements in post-release mortality of threatened and endangered species. This may result in the fishery not achieving the post release mortality targets required under the June 2004 BiOp for the pelagic longline fishery, and thus, may result in future closures that would result in extensive long-term negative economic impacts to the pelagic longline fisheries.

Alternative A2, the preferred alternative, considers mandatory workshops and certification for all HMS pelagic and bottom longline *vessel owners*. This alternative will likely result in some short-term negative economic impacts, as a result of the cost of traveling to workshops and the opportunity cost of earnings foregone for the lost fishing and business time that may be incurred by participants that would be required to attend these mandatory workshops. It is estimated that 549 vessel owners permitted to fish for HMS with longline gear would participate in these workshops. Based on 2004 HMS logbook data, it is estimated that an owner's share of their vessel's revenue for bottom and pelagic longline vessel owners is

approximately \$281 and \$448 per day, respectively. The total opportunity cost for this alternative is thus estimated to be between \$154,269 and \$258,048 in the first year for all vessel owners combined. After the first year, the subsequent costs will depend on how many people enter the fishery. In addition, travel costs would be incurred that would be specific for each workshop location and distance traveled.

Alternative A3, a preferred alternative, considers mandatory workshops and certification for *vessel operators* actively participating in the HMS pelagic and bottom longline fisheries. This alternative would have similar economic impacts to alternative A2, except this alternative would impact operators, not vessel owners. It is estimated that 1,098 operators, assuming two operators per vessel, would participate in workshops under this alternative. Based on 2004 HMS logbook data, it is estimated that an operator's share for bottom and pelagic longline vessel operators is \$345 and \$149 per day at sea, respectively. The total opportunity cost for this alternative is thus estimated to be between \$163,602 and \$378,810 in the first year for all vessel operators combined. In addition, travel costs would be incurred.

Alternative A4 considers mandatory workshops and certification for all HMS longline vessel owners, operators, and crew. NMFS estimates that this alternative would result in 3,843 participants attending the workshops. Of this amount, 2,196 participants are estimated to be crewmembers. Based on 2004 HMS logbook data, it is estimated that a crewmember's share for bottom and pelagic longline vessel crewmembers is \$90 and \$109 per day at sea, respectively. Combining the total crewmember opportunity cost with the total owner and operator opportunity costs discussed above for alternatives A2 and A3, the total opportunity cost for this alternative is estimated to be between \$515,511 and \$876,222 in the first year. In addition, travel costs would be incurred that would be specific for each workshop location and distance traveled.

Alternative A5, a preferred alternative, considers mandatory workshops and certification for shark gillnet vessel owners and operators in the safe handling and release of protected resources, including sea turtles, smalltooth sawfish, and marine mammals. Individual opportunity costs are not available for gillnet vessel owners and operators due to confidentiality concerns, however the median opportunity cost for vessel owners and operators of all gear types combined, including gillnets, to participate in a one-day workshop would be \$578 (\$424 owner's share plus \$154 captain's share). The costs incurred by the vessel owners and operators would be related to travel and the opportunity costs of time to attend the workshop.

Alternative A6 prefers a renewal timeline for workshop certifications. NMFS considered three different recertification timelines: every two years, three years, and five years. Recertification every two years would likely have the greatest economic impacts on participants and five years would result in the least negative economic impacts to the fishing community, because it would result in the most infrequent recertification schedule. Using the range opportunity costs estimated for preferred alternatives A2 and A3, the estimated net present value (using the Office of Management and Budget's recommend seven percent discount rate) of the opportunity costs associated with recertification ten years after initial certification would be between \$1.4 and \$2.1 million for recertification every two years, \$1.0 and \$1.5 million for recertification every three years, and \$0.6 and \$0.9 million for recertification every five years. A recertification frequency of three years appears to be an appropriate compromise of ecological



and economic impacts. This period would allow for sufficient retraining to maintain proficiency and update fishermen on new research and development related to the subject matter while not placing an excessive economic burden on the participants due to lost fishing time and travel resulting from attending a recertification workshop in person. The extent of the impacts would depend on the mechanism for recertification. In addition, the Agency is also considering alternative media for recertification in order to reduce costs. If an owner or operator is unable to attend a scheduled workshop, NMFS will consider granting one-on-one training at the expense of the permit holder. These one-on-one training sessions would accommodate the replacement of a captain whose employment was terminated on short notice or a change in ownership of a vessel, but, again, these sessions would be at the expense of the permit holder.

In addition to the workshops focusing on protected species release, disentanglement, and identification workshops for pelagic longline, bottom longline, and gillnet fishermen, NMFS considered several alternatives for HMS identification workshops. The No Action alternative (A7) is not anticipated to result in any change, either positive or negative, in economic impacts, primarily because current activities related to the dissemination of information to assist in identifying HMS would remain the same.

Voluntary workshops (A8) are not anticipated to result in any substantial economic changes, either positive or negative, primarily because attendance would be voluntary and at the discretion of the participants. Any associated travel costs may be considered a minimal economic impact, as it is not likely that participants would go to substantial expense and trouble for this type of voluntary training. In the long-term, misidentification could result in unquantifiable economic costs if sharks do not rebuild as a result of stock assessment data not being accurate.

Under alternatives A9 through A15, social and economic impacts on each individual would be similar in nature since each of the alternatives involve one day workshops that result in opportunity costs and travel costs. The main difference between alternatives is that the number of attendees and the associated overall total costs, taking all individuals into consideration, vary by alternative. Under alternative A9, the preferred alternative, mandatory workshops and certification for federally permitted shark dealers, it is estimated that there would be over 336 workshop participants. Under alternative A10, mandatory workshops for all shark, swordfish, and tuna dealers, it is estimated that there would be over 1,037 participants. Information regarding HMS dealer earnings is not available therefore the expected opportunity costs of alternatives A9 and A10 are unquantified at this time. Nevertheless, given the number of dealers involved, NMFS would expect alternative A9 to have less of an economic impact than alternative A10.

Under alternative A11, mandatory workshops and certification would include all commercial longline vessel owners, which currently total 549. Alternative A11 would result in opportunity costs equivalent to alternative A2 of between \$154,269 and \$245,952 for the first year. Under alternative A12, mandatory identification workshops would include all commercial longline vessel operators, which would include approximately 1,098 participants. Alternative A12 would result in opportunity costs equivalent to alternative A3 of between \$154,269 and \$378,810 for the first year. Under alternative A13, mandatory workshops and training

certification for all commercial vessel owners (longline, CHB, General category, and handgear/harpoon), which includes approximately 9,636 participants. Under alternative A14, mandatory workshops and certification would be required for all commercial vessel operators (approximately 10,374). Under alternative A15, mandatory workshops and certifications would be required for all HMS angling permit holders, total approximately 25,238. Thus, alternative A15 would have the greatest economic impact of the alternatives considered for species identification workshops.

On an individual basis, the only costs anticipated to be incurred by fishermen or dealers would be those related to travel and time to attend the workshops. The opportunity cost to all commercial vessel owners is estimated to be \$424 per day in net revenue for all gear types based on HMS logbook cost earnings data for 2004. The opportunity cost to all commercial operators is estimated to be \$154 per day for all gear types and \$97 per day for crewmembers. Using these estimates of opportunity cost, alternative A13 would result in a total of approximate \$4,085,664 in opportunity costs in the first year. The total opportunity cost for alternative A14 is estimated to be \$1,597,596 in the first year. Daily opportunity cost estimates for dealers, anglers, and CHB owners and operators are not currently known. The administrative costs to NMFS for the workshops is high, but may be exceeded by the benefits associated with the possible impacts from increased education, as well as, the benefit of avoiding future management actions if BiOp takes are exceeded.

Under alternative A16, social and economic impacts would vary depending on the frequency of recertification workshop attendance required – every two, three, or five years. Furthermore, economic impacts would be dependent on the type of recertification selected by the agency. Hands-on, in-person recertification workshops would result in additional travel costs and lost fishing time. However, the Agency may consider alternative media for recertification, including: DVDs, printed materials, and/or web-based recertification. Negative economic impacts would be greater for shorter recertification frequencies due to more frequent travel costs and potential down time from fishing, although NMFS intends to schedule recertification workshops so as to minimize these factors, to the extent possible. In an effort to reduce economic impacts to shark dealers, the schedule for HMS Identification Workshops would be available in advance to allow dealers to select workshops close to them and most convenient to their schedule. If a dealer and/or proxy is unable to attend a scheduled workshop, NMFS will consider granting one-on-one training at the expense of the dealer. These one-on-one training sessions would accommodate the replacement of a proxy whose employment was terminated on short notice, but, again, these sessions would be at the expense of the permit holder. If dealer employee turnover is high and the renewals are scheduled every five-years, a dealer may pay for a greater number of one-on-one training sessions than with a three-year timetable.

#### ***6.4.1.2 Time/Area Closures***

Alternative B1, the no action alternative to maintain existing closures has, and would likely continue to have, negative economic impacts on the pelagic longline industry. Existing closures may have contributed to the reported 15 percent decline in fishing effort, a 10 percent decline in the number of directed and incidental permits, and a decline from 199 to 130 active pelagic longline permits from 2000 to 2004. Chapter 4 details the economic impacts and analyzes conducted to estimate the impacts of the various time/area closure alternatives.

Alternative B2(a) would potentially impact a total of 61 vessels and potentially result in an 11 percent decline in fishing effort, and reductions in landings of target species ranging from a minimum of one percent for bigeye tuna to a maximum of 14.3 percent for yellowfin tuna. The combined total loss in gross revenues for alternative B2(a) without redistribution of effort would be approximately \$2,299,018 annually. With redistribution of effort, alternative B2(a) is predicted to result in an increase in all targeted species landings and gross revenues except yellowfin tuna, which are predicted to decrease by one percent for a loss of approximately \$138,204 annually. The combined total gain in gross revenues for alternative B2(a) with redistribution of effort would be approximately \$1,242,832 annually. If, on the other hand, effort is displaced into open areas of the Gulf of Mexico only, gross revenues are predicted to decrease by \$5,003,298 (6.8 percent of total 2003 HMS fisheries revenues), or \$108,767 per vessel annually with no redistribution of effort. With redistribution of effort into the open areas of Gulf, there would be a predicted increase in gross revenues of \$679,212. The predicted economic impacts to gross revenues for the fleet could range from a loss of approximately \$5.0 million to a gain of approximately \$1.2 million (6.8 to 1.6 percent of total 2003 HMS fisheries revenues).

Alternative B2(b) would potentially impact a total of 20 vessels. The combined total loss in gross revenues for the alternative B2(b) closure without redistribution of effort would be approximately \$299,120 annually. Specifically, swordfish landings would potentially decrease by \$231,252 annually. However, with redistribution of effort, the combined total loss in gross revenues for alternative B2(b) would be approximately \$72,675 annually.

Alternative B2(c) would potentially impact a total of 75 vessels. The combined total loss in gross revenues for the alternative B2(c) closure without redistribution of effort would be approximately \$3,136,229 annually. Specifically, yellowfin tuna gross revenues, the most lucrative species affected by alternative B2(c) and also the most lucrative HMS species, could decrease by \$2,483,678 annually. However, with redistribution of effort, the combined gain in gross revenues for alternative B2(c) would be approximately \$1,651,023.

Alternative B2(d) would potentially impact a total 78 vessels. The combined total loss in gross revenues for the alternative B2(d) closure without redistribution of effort would be approximately \$10,683,133 annually. Yellowfin tuna gross revenues would be the most impacted, with estimated loss of \$8,035,791 annually. However, with redistribution of effort, it is predicted that an overall increase in gross revenues of approximately \$6,014,934 annually primarily due to potential increases in swordfish and bigeye tuna landings as effort redistributes.

Alternative B2(e), a 46,956 nm<sup>2</sup> closure in the Northeast, would potentially impact a total of 49 vessels. The combined total loss in gross revenues for alternative B2(e) without redistribution of effort would be approximately \$3,234,660 annually. However, with redistribution of effort, gross revenue losses are predicted to total only \$820,132 annually (1.1 percent of total 2003 HMS fisheries revenues).

Combining closures of B2(d) and B2(e) year-round would potentially impact a total of 127 vessels that fished in that area and without redistribution of effort would result in decrease in

landings valued at \$12.9 million annually based on 2003 prices or \$13.25 million based on 2004 prices. With redistribution of effort revenues could potentially increase by \$7,802,425.

Modifications to two closed areas, alternatives B3(a) and B3(b), would potentially result in positive economic impacts. Re-opening areas of either closure would allow fishermen access to previously closed fishing grounds, resulting in increased landings of targeted species. However, this may create gear conflicts between recreational and commercial fishermen. Conversely, the modified area of B3(a) would be along the axis of the Gulf Stream, which would afford recreational fishermen closed portions inshore and allow pelagic longline vessels to fish in re-opened areas offshore.

Alternative B3(a), the Charleston Bump modification, would result in approximately a total increase in landings worth \$234,460 annually with approximately \$220,806 annually for swordfish alone. Alternative B3(b), the NEC modification, would potentially increase gross revenues by approximately \$550 annually.

Alternative B4, the preferred alternative to implement complementary HMS management measures in Madison-Swanson and Steamboat Lumps Marine Reserve, could potentially impact commercial and recreational HMS fishery participants. However, the impact is likely to be low considering that between 1997 and 2003 only one pelagic longline set and two bottom longline sets were reported in the HMS logbook in these areas. Because the preferred closure areas are relatively small, any HMS fishing activity that otherwise would have occurred in these areas would likely relocate to nearby open areas with similar catch rates. The impact of this alternative on HMS recreational and charter/headboat fishing is unknown. However, because this alternative includes the seasonal surface trolling allowance during prime fishing season, it is not expected to substantially impact the HMS recreational and charter/headboat sector.

Alternative B5, which establishes criteria for regulatory framework adjustments for implementing new or making modifications to existing time/area closures, would have no direct economic impacts. However, the ultimate implementation of new, or modification of existing closures could have variable economic impacts depending on whether time/area closures are modified, removed or added. Future modifications to time/area closures will be analyzed for their social and economic effects on fishermen, recreational anglers, businesses, and communities.

Alternative B6, the closure off the southwest tip of Key West to bottom longline gear to protect smalltooth sawfish, would be expected to have minimal negative economic impacts. It is estimated that this alternative could affect 1.3 percent of commercial bottom longline sets based on the number of sets in this area between 1994 and 2003. This alternative would help reduce the number of interactions with smalltooth sawfish, and thereby help the bottom longline industry stay below their Incidental Take Statement (ITS) for smalltooth sawfish. Staying below the ITS will have positive economic and social impacts by keeping the entire bottom longline fishery open and operating, allowing economic activity to continue for the bottom longline fishermen and associated shore side businesses.

Alternative B7, prohibiting longlining in all areas, would potentially impact a total of 177 active vessels reporting landings in the Pelagic Longline Logbook. This alternative would have significant economic impacts on the longline vessel owners, operators and crew that would need to re-rig their vessels to continue fishing for HMS, find alternative fisheries, or discontinue fishing. It would also negatively impact dealers that purchase fish from pelagic longliner vessels and also other onshore business that support the industry. The closure of the pelagic longline fishery would result in, at a minimum, a loss of \$25.8 million in gross revenues (35 percent of total 2003 HMS fisheries revenues). This estimate does not include the potential loss in revenues from sharks, tunas, and other finfish landings. This alternative would also likely have adverse impacts on shoreside support businesses and dealers.

## **6.4.2 Rebuilding and Preventing Overfishing**

### **6.4.2.1 *Northern Albacore***

None of the alternatives considered to address northern albacore would result in impacts different from alternative C1, no action, as the United States is currently fishing below its ICCAT allocation for northern albacore. The impact of alternative C2, unilateral action for the U.S. fleet to reduce landings, would be a reduction in income, but this reduction would be small on the U.S. fishery since the level of landings for albacore is two orders of magnitude smaller than swordfish and shark landings. For the recreational fishery, alternative C2 would result in target species shifts to other opportunistic target species as well as catch-and-release of albacore. Economic impacts would be difficult to evaluate for the recreational fishery since there is such a high variation in the catch from year to year. Alternative C3, which would establish the foundation for developing an international rebuilding program, itself has no economic impact. As ICCAT has not yet adopted a rebuilding program for northern albacore tuna, an analysis of the social and economic impacts from any international rebuilding program resulting from alternative C3 cannot be conducted at this time. If the ICCAT Rebuilding Program involves a substantial reduction in allowable catch, there would likely be a short-term reduction in economic benefits to the longline fishery until the stock recovers. Since recreational fishermen target northern albacore tuna at certain times of the year and in certain areas, it is difficult to estimate the effect that a reduction in allowable landings of northern albacore would have on angler consumer surplus. It might be reduced, but to an unknown extent, since many recreational trips targeting northern albacore tuna often target other tuna species.

### **6.4.2.2 *Finetooth Sharks***

Alternative D1, the no action alternative, would not likely result in any adverse economic or social impacts since this alternative would not substantially modify or alter commercial or recreational fishing practices for finetooth or other species of shark. In the long-term, if finetooth sharks become overfished, there could be larger economic impacts.

Alternative D2, commercial management measures, considers the use of trip limits, modifying gillnet size, specifying maximum soak times, prohibiting the use of gillnet for targeting sharks, and reducing the quota for small coastal sharks (SCS). These commercial

management measures may impose negative economic impacts on a limited number of gillnet vessels that land sharks and potentially other operations.

Implementing a trip limit for finetooth sharks would increase the amount of travel to and from port resulting in lost fishing time and increased expenditures for fuel. The trip limit may also impact directed shark permit holders targeting other finfish species if they end up catching enough finetooth sharks during a trip to reach the limit, and thus reducing the number of sets that could be conducted per trip. However, the impact to directed shark permit holders targeting other finfish is likely to be to a lesser degree since it is assumed that finetooth sharks would comprise a smaller proportion of their landings. In addition, some fishermen targeting finfish species might discard some of the finetooth sharks that they catch to avoid having trips shortened as a result of reaching a trip limit.

Modifying gillnet mesh size requirements may impact a small number of gillnet vessels that direct on sharks, causing them to potentially replace existing gear in order to comply with any new requirements. Specifying maximum soak times for gillnet vessels targeting sharks may impose a negative economic effect as vessels would have to work longer hours and make more sets in order to maintain their current catch levels.

Alternatively, reducing the quota for SCS may have a negative impact depending on the amount of the reduction. The SCS quota reduction would have to be more than 25 percent to cause economic impacts on the shark gillnet fishery given historical landings.

Closing the directed the directed shark gillnet fishery would result in negative economic impacts for at least five vessels actively participating in the shark gillnet fishery, but minimal economic impacts on the shark fishery as a whole. Closing the shark gillnet fishery would likely cause economic dislocation of at least five individuals or small entities and possibly up to 15 vessels having reported landing finetooth sharks in Federal logbooks recently. These vessels would still be able to harvest sharks but only with other authorized gear types. The costs of refitting vessels to fish with other authorized gears could be substantial.

Alternative D3, considers management measures to reduce recreational fishing mortality of finetooth sharks including requiring circle hooks and increasing the existing size limit for finetooth sharks. The potential impacts that could result from requiring circle hooks are unknown. Requiring circle hooks when targeting SCS may result in negative impacts to the shark recreational anglers and related industries as a result of adjusting to this new gear, but those costs are not likely to be significant especially given the potentially lower cost of circle hooks (see discussion below regarding billfish and circle hooks). Increasing the existing size limit for finetooth may result in some negative economic impacts. However, the economic impact may be variable depending on the willingness of anglers to release finetooth sharks caught and/or substitute harvested fish with other similar species. In addition, finetooth sharks only comprise less than two percent of the overall SCS recreational harvest, so the economic impact to the recreational fishery is likely to be low. Tournaments would still be able to offer prize categories for finetooth sharks provided they are above the minimum size.

The preferred alternative (D4), identifying sources of finetooth shark fishing mortality to target appropriate management actions, would have minor economic impacts (*e.g.*, food costs for observer on board and potential safety compliance costs). The expansion of the shark gillnet observer program in 2005 to vessels targeting species other than sharks covered an additional 30 trips from eight vessels. The number of vessels fishing with gillnet gear for species other than shark, possessing a shark permit, and not currently subject to observer coverage is estimated at approximately ten vessels. These vessels would have to attain the proper safety certification decals from the United States Coast Guard and ensure that there are adequate accommodations on board for observers prior to taking an observer. Other efforts to expand data that is currently collected on shrimp trawl vessels would not result in any economic impacts as the percentage of observer coverage would not be expanded, only the selected species of bycatch that are sampled. In the long-term, gaining knowledge as a result this preferred alternative could minimize economic impacts while sustaining the population.

#### **6.4.2.3 Atlantic Billfish**

Eight alternatives are being considered for the management of the directed Atlantic billfish fishery. Alternative E1, the No Action alternative, would likely have no positive or negative short-term economic impacts. In the long-term, the No Action alternative could result in large adverse economic impacts if billfish are put on the endangered species list or if billfish populations do not recover and continue to decline.

Alternative E2, requiring the recreational fishery to use only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations, would likely have limited adverse social and economic impacts. There are an estimated 7,915 billfish anglers in the U.S. Atlantic and 1,627 billfish anglers in Puerto Rico (Ditton and Stoll, 2003). The universe of vessels that could be impacted by circle hook requirements are the 25,238 Angling, 4,173 CHB, and 4,824 valid General category permits. A comparison of current J-hooks and circle hook prices indicates that anglers would, on average, pay 46 cents less for circle hooks compared to J-hooks if a shift in demand for circle hooks does not significantly affect prices. The delay in implementation of this alternative is anticipated to allow hook manufacturers, retailers, and anglers adequate time to utilize current inventories of J-hooks, thereby minimizing adverse economic impacts associated with alternative E2. This alternative may result in a temporary decrease in angler consumer surplus given anticipated or real loss of fish as fishermen adjust to and become more proficient with the use of circle hooks, but some studies of circle hook effectiveness indicate that there could be increased catches, and therefore angler consumer surplus associated with circle hooks. While unlikely, it is possible that there could be a decrease in tournament participation and demand for CHB trips, as well as trips taken by individuals based on real or perceived declines in catch. Overall, alternative E2 may provide long-term positive benefits with regard to increased angler consumer surplus and willingness to pay if circle hooks contribute to rebuilding efforts and result in increased encounter rates.

Alternative E3, a preferred alternative limiting all Atlantic billfish tournament HMS permitted vessel participants to using only non-offset circle hooks when using natural baits or natural bait/artificial lure combinations, is similar in economic impact to alternative E2, but reduced given the smaller universe of effected individuals. NMFS is not able to quantify the exact number of anglers or vessels participating in tournaments that may be impacted. However,

it is known that in 2003 and 2004, there were 244 and 215 registered HMS tournaments, respectively, and that the average number of vessels participating in a tournament was 47 for the period 1999-2004. It is possible, but unlikely, that this alternative will result in decreased tournament participation. The impacts to hook manufacturers, retailers, and anglers would likely be limited given that J-hooks would continue to be permitted outside of tournaments, and in tournaments with artificial lures. Angler recreational consumer surplus impacts would be similar to that of alternative E2, but would impact a smaller universe.

Alternatives E4(a) and E4(b) would increase the minimum size for blue and white marlins. It is uncertain if these measures would or would not affect angler participation rates. High current catch-and-release rates, tournaments that establish minimum sizes greater than the current limit, and past surveys indicate that minimum sizes have not affected billfish fishing activity. As reported in Table 4.3, very high percentage of blue marlin, white marlin, and sailfish were released in tournaments. Thus, NMFS expects that any resultant negative economic impacts of these alternatives would be minor.

Alternative E5, recreational bag limit of one Atlantic billfish per vessel per trip, would likely have minor impacts. Given that the recreational billfish fishery has low CPUE rates and the chances of landing more than white or blue marlin on a single trip is low, it is reasonable to assume that anglers would maintain current levels of participation based on the opportunity of catching and possibly landing one trophy-sized fish. It is possible that there will be an unquantified decrease in demand for CHB trips if not all individual anglers on a given trip would have the opportunity to land a billfish. Furthermore, tournament participation would not be expected to decrease in a substantial manner as tournament rules often prohibit participants from entering more than one marlin per day.

Alternative E6, which would implement the ICCAT recommendation for a recreational marlin landings limits, is anticipated to result in minimal to moderate adverse economic impacts depending on catch rates, angler response, and which of the available management actions become necessary. Historical data suggest that it is unlikely that the United States will achieve the 250 marlin landing limit.

Three scenarios were analyzed regarding whether certain thresholds for in-season management action are achieved to estimate the potential impacts of this alternative. If the threshold for inseason management action is not achieved, then alternative E6 would not be expected to result in impacts to the recreational marlin fishery. If the threshold for an inseason minimum size increase is achieved, NMFS believes it is unlikely that there would be a substantial decrease in demand for charter/headboat trips, trips by individual anglers, or participation in billfish tournaments given the catch-and-release ethic of billfish anglers. On the other hand, if the threshold for implementing catch-and-release only fishing is achieved, there could be some economic impacts. In a worst case scenario, marlin anglers may reduce their demand for charter fishing trips by between 0.4 and 24.2 percent of the available trips remaining during a given season, and the average cost of a CHB trip was \$1,053 in 2004. Private vessel owners who fish for marlin may also reduce participation by between 0.4 and 24.2 percent; however, the economic impact for this is unquantifiable at this time.



In addition, NMFS estimates that between 0.8 and 10.1 percent of tournaments may cease to operate in a worse case scenario during a catch-and-release only time period based on RBS data on billfish tournament release rates. If the threshold were reached in May under a fishing year schedule, 16 tournaments, between 6.5 and 7.5 percent of registered tournaments, could be impacted and between zero and four tournaments (less than two percent of registered tournaments) may cease to operate. However, even these low numbers may be an overestimate given the recent evidence that anglers may be willing to pay more for catch-and-release tournaments. A reduction in one to four tournaments could result in an estimated adverse direct economic impact of \$1,375,439 to \$5,501,756 and result in some small decrease in consumer surplus for anglers participating in those tournaments. Impacts on shoreside businesses would likely be minor, but could be increased or decreased depending on angler response and when in the season a shift to catch-and-release only fishing might occur. Alternative E6 could have smaller long-term adverse economic impacts than alternative E1, if landing rates increase in the future, since E6 allows NMFS more flexibility on when and if action should be taken to remain consistent with international standards.

Alternative E7, which would allow only catch-and-release fishing for Atlantic white marlin for a five-year period, could potentially lead to negative economic impacts, although the magnitude is difficult to assess. The short-term social impacts of not being able to land trophy or record category fish is difficult to assess, however NMFS anticipates that this alternative could lead to a decrease in angler willingness-to-pay and angler consumer surplus. The long-term impacts of alternative E7 may result in an increase in net benefits as stocks rebuild and recreational encounters with white marlin become more frequent. The Agency estimates that alternative E7 could result in between \$49,491 and \$1,320,462 in lost revenues to CHB vessels annually. The loss of revenues of this magnitude would likely result in minor to moderate negative social and economic impacts to the CHB sector; however, considering the catch-and-release ethic of billfish anglers (31 white marlin reported landed in 2004), NMFS anticipates that negative impacts under this alternative would be less severe than those calculated above. Under alternative E7, negative social and economic impacts could occur if General category vessels that normally participate in HMS tournaments cease participating in tournaments. Any negative impacts would likely be reduced if these vessels already practice catch-and-release fishing for white marlin and participate in catch-and-release tournaments. In 2004, there were 129 registered tournaments that awarded points or prizes for white marlin (see Chapter 3). Assuming that one to four tournaments cease operations, the Agency estimates that alternative E7 could result in negative economic impacts ranging from \$1,375,439 to \$5,501,756. However, considering the catch-and-release ethic of billfish anglers, NMFS anticipates that negative impacts under this alternative would be of a lesser magnitude than those calculated above. The delayed effective date is anticipated to allow tournament operators sufficient time to alter tournament rules to provide for a catch-and-release format and allow anglers to adjust to new requirements. Angler willingness-to-pay and consumer surplus would likely remain high, given the currently high release rate of white marlin, which is reinforced by the low number of verified landings that occurred in recent years. However, it is possible that angler consumer surplus may decrease given the inability to land white marlin. Further, under alternative E7, anglers would still have the ability to land other billfish, including trophy-sized sailfish and blue marlin.

Alternative E8, which would allow only catch and release fishing for Atlantic blue marlin, is similar to E7 and could potentially lead to negative economic impacts, although the magnitude is difficult to assess. Alternative E8 is likely to have a greater economic impact than the white marlin catch and release only alternative since more blue marlin are landed than white marlin and since there are more blue marlin tournaments than white marlin tournaments. Angling category fishermen may reduce the number of trips targeting blue marlin under this alternative. Estimating that between 461 and 2,862 trips may be canceled given the inability to retain blue marlin, this alternative could result in between \$485,433 and \$3,013,686 in lost revenues to CHB vessels annually. The loss of revenues of this magnitude would likely result in moderate negative social and economic impacts to the CHB sector. However, considering the catch-and-release ethic of billfish anglers, NMFS anticipates that negative impacts under this alternative would be of a lesser magnitude than those calculated above. Negative economic impacts could occur if General category vessels that normally participate in HMS tournaments cease operations. In 2004, there were 142 registered tournaments that awarded points or prizes for blue marlin captures (see Chapter 3). NMFS estimates that 10 to 14 tournaments could cease operations, and therefore alternative E8 could result in negative economic impacts ranging from \$13,754,390 to \$19,256,146. The loss of revenues of this magnitude would likely result in sizable local economic impacts for tournaments, tournament participants, and associated businesses. Angler consumer surplus would likely remain high, given the currently high release rate of blue marlin, which is reinforced by the low number of verified landings that occurred in recent year. However, it is possible that angler willingness-to-pay, and thus angler consumer surplus, may decrease given the inability to land blue marlin. Further, under alternative E8 anglers would still have the ability to land other billfish, including trophy-sized sailfish and white marlin. To mitigate negative socio-economic impacts, alternative E8 would delay implementation of catch-and-release-only fishing requirements to allow the fishery time to adjust to new measures.

### **6.4.3 Management Program Structure**

#### ***6.4.3.1 Bluefin Tuna Quota Management***

Alternative F1, the no action alternative, may have both positive and adverse economic impacts. The positive impacts are associated with the General category time-periods and associated subquota allocation percentages remaining consistent with those of prior years, as well as maintaining the General category New York set-aside allocation for those participants operating in that designated area. The adverse impacts associated with this alternative result from the Agency's inability to adapt BFT management measures to account for variations inherent to the fishery from one year to the next. This alternative would also have some adverse economic impacts on fishermen, dealers, and the support industries located in the south Atlantic region, due to the fact that BFT quota tends to be harvested prior to BFT arriving later in the season (Nov. - Jan.) off the southern Atlantic coast and current allocations do not provide for a formal winter fishery.

Alternative F2, the establishment of General category time-periods, subquotas, and geographic set-asides annually via regulatory framework adjustments, would provide NMFS with more flexibility to establish management measures more expeditiously. However, constituents would not be provided long-term certainty in the General category quota allocation

scheme around which they could devise a business plan. There may also be positive social and economic impacts attributed to increases experienced in a domestic quota category, time-period subquotas, or geographic set-aside quota in a given year; however, the likelihood of experienced negative social or economic impacts due to a decrease in any of these areas is equally the same.

Alternative F3, the preferred alternative, would blend aspects of alternatives F1 and F2 together to optimize the positive economic impacts associated with this alternative by enhancing NMFS' flexibility to adapt to the fisheries inherent variability by authorizing adjustments to the General category time-periods, associated subquotas, and geographic set-asides via a regulatory framework adjustment. This alternative would have positive economic impacts on the General category as a whole by providing reasonable fishing opportunities to General category BFT fishery participants throughout the range or the time of year that BFT are readily available to them.

There are four subalternatives associated with alternative F3. F3(a) would distribute the coastwide General category quota equally among the eight months that currently make up the General category BFT season (June-January), by allocating in 12.5 percent shares to each month. This subalternative would have both positive and negative social and economic impacts as it would provide some stability to the constituency by establishing a known amount of quota that would be available at the first of each month. However, if catch rates tend to be high, these quotas could be harvested rapidly and could lead to derby style fisheries on the first of each month, which is contrary to NMFS' intent. While this subalternative would formalize the recent General category winter BFT fishery, it would do little to recognize historical General category BFT allocations. Therefore, this subalternative would result in positive social and economic impacts for those General category participants located in the south Atlantic region attributed to a 40 percent increase in available quota, compared to the no action alternative, during the time frame of October through January. This increase in quota would equate to approximately four million dollars in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area or those participants which pursue BFT in the summer months may experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 22.5 percent and the September time-period allocation would be reduced by approximately 17.5 percent. These reductions in allocation would result in decreased gross revenues of approximately \$2.5 and \$2 million, respectively. This subalternative would also reduce the need for specific geographic set-asides because quota allocation would be made on a monthly basis and would be evenly distributed. This subalternative would assist in distributing the General category BFT catch, temporally and geographically, which is beneficial for the collection of CPUE data and could assist in avoiding large scale landings in a constrained time frame, thus reducing market gluts.

Subalternative F3(b) would implement General category time-periods, and associated subquota allocation percentages similar to those contained in the 1999 FMP, but would separate the October through January time-period into three distinct time-periods of October through November, December, and January, and establish a formal General category winter BFT fishery on which fishermen, dealers, and supporting industries could depend and plan. The General

category time-period subquota allocation percentages would be adjusted slightly to incorporate the allocations in the winter months, but would still recognize the historical General category allocations during the summer and fall months.

This subalternative would have positive social and economic impacts to those General category participants located in the south Atlantic region attributed to a 9.5 percent increase in available quota, compared to the no action alternative, during the time from of October through January. This increase in quota would equate to approximately \$1.1 million in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area or to those participants which pursue BFT in the summer months may experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 6 percent and the September time-period allocation would be reduced by approximately 3.5 percent. These reductions in allocation would result in a decrease of early season gross revenues of approximately \$0.7 and \$0.4 million, respectively. These negative impacts may be mitigated by individuals traveling to where the BFT are located at any time of the season. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

Subalternative F3(c), the preferred alternative, would implement the same time-periods as mentioned in Subalternative F3(b), but would implement slightly different subquota allocation percentages for the June through August and October through November time-periods. This subalternative was designed to redistribute the quota from the early time-periods to provide a winter General category BFT fishery to during the months of December and January. This subalternative would reduce the allocation to the June through August time-period to a higher degree, than subalternative F3(b) and increase the suballocation to the October through November time period, thus shifting more of the potentially adverse social and economic impacts to the earliest portion of the season.

This subalternative would enhance equity among regional General category participants, given that access to fish available at different times of the year in different locations is likely to occur. Because this alternative would allocate General category quota based on a balance between historical General category BFT allocations, recent BFT landing trends, and the NCDMF Petition for Rulemaking, there would be no significant social or economic impacts to the fishery as a whole. However, this subalternative would have similar positive and adverse social and economic impacts as outlined in Subalternative F3(b). The adverse social and economic impacts would be slightly shifted to the earliest portion of the fishery, where the General category subquota allocations have traditionally been the highest. This subalternative would have positive social and economic impacts to those General category participants fishing in the later portion of the season due to a 13.5 percent increase in available quota, compared to the no action alternative, during the time from of October through January. This increase in quota would equate to approximately 1.5 million dollars in additional gross revenue for the later part of the General category season. However, those General category participants who pursue BFT in the summer months may experience some adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status

quo June through August time-period subquota allocation would be reduced by approximately 10 percent and the September time-period allocation would be reduced by approximately 3.5 percent. These reductions in allocation would result in a decrease of gross revenues of approximately \$1.2 and \$0.3 million, respectively for each of these time periods.

Reallocating more quota from the June through August time-period to the later time-periods would slightly mitigate some of these adverse social and economic impacts because the amount of quota being reallocated would equate to a smaller percentage of the June through August subquota relative to the other time-period subquotas. This subalternative is preferred due to the balance it strikes between providing all General category BFT fishery participants an equitable opportunity to harvest a portion of the coastwide General category quota, while still recognizing the historical participation in this fishery. Any adverse social or economic impacts associated with this alternative would be minimized and may even be mitigated as fishermen are allowed to travel to the geographical location of where the BFT are located at any give time. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

Subalternative F3(d) would implement the same time-periods as described in Subalternatives F3(b) and F3(c), but would allocate the General category time-period subquota in accordance with the NCDMF's Petition for Rulemaking (*i.e.*, 150 mt total for the months of December and January or approximately 21.7 percent of the coastwide General category quota). This alternative would have a greater positive social and economic impact to General category participants in the south Atlantic region, region due to a 24.7 percent increase in available quota, compared to the no action alternative, during the time from of October through January. This increase in quota would equate to approximately \$2.6 million in additional gross revenue for the later part of the General category season. However, those General category participants in the New England area or to those participants which pursue BFT in the summer months may experience greater adverse social and economic impacts due to the shift in quota to the later portion of the season. For instance under this alternative, the status quo June through August time-period subquota allocation would be reduced by approximately 21.3 percent and the September time-period allocation would be reduced by approximately 3.4 percent. These reductions in allocation would result in decrease gross revenues of approximately \$2.5 and \$0.3 million, respectively. These negative impacts may be mitigated by individuals traveling to where the BFT are located at any time of the season. However, NMFS has little specific information at this time regarding the costs that would be incurred due to this travel.

Alternative F4 would clarify the procedures NMFS uses in calculating the ICCAT recommendations regarding the eight percent tolerance for BFT under 115 cm. This alternative would have slightly more positive economic impacts as it would slightly increase the school size-class BFT quota by approximately two mt ( 0.02 percent) of the status quota allocation.

Alternative F5 would maintain the status quo process currently used in allocating the ICCAT-recommended U.S. BFT TAC domestically, the accounting for annual under/overharvest, and establishing General category effort controls. This alternative is not expected to have any substantial economic impacts.

Alternative F6 would have slightly more positive economic impacts, in comparison to F5, as each baseline domestic quota category allocation, quantified in metric tons, would be codified in the regulatory text implementing the consolidated HMS FMP. This alternative would have positive economic impacts to the domestic BFT fishery as a whole by allowing BFT fishery participants, either commercial or recreational in nature, to make better informed decisions on how to best establish a business plan for the upcoming season.

Alternative F7, which would not allow carry forward of unharvested quota from one fishing year to the next, would likely have the most adverse economic impact of all the annual BFT management measure alternatives. This alternative could lead to derby style fishing where vessels may operate in less than optimal conditions to harvest the quota before the season is closed. This alternative could also result in a domestic quota category not receiving a quota transfer from another domestic quota category with large amounts of underharvest to assist in covering an overharvest situation, which could result in that category having quota deducted from the following year. This could result in reduced fishing opportunities, income, and angler consumer surplus for the commercial and/or recreational fleet, as well as the businesses that support those BFT fisheries.

Alternative F8, which would limit the amount of unharvested BFT quota in each category that could be carried forward, would have both slightly positive and negative economic impacts on the BFT participants. This would limit the maximum amount of revenue each domestic quota category could generate to no more than double the value of the baseline allocation. These potential negative economic impacts would be mitigated, overall, by reallocation of tonnage that exceeds the cap to the Reserve or to another domestic quota category.

Alternative F9 maintains inseason action procedures. When catch rates are low, a liberalized retention limit of two or three BFT may have positive economic impacts on a vessel that is able to harvest multiple fish especially if ex-vessel prices are high during a low catch rate period. However, if catch rates were to increase dramatically over a short period while retention limits were set at the upper end of the allowable range, large numbers of BFT could be landed in a short time period, thus flooding the market and depressing ex-vessel prices.

Alternative F10 would have slightly more positive economic impacts, as the criteria NMFS must consider when making inseason action determinations would be consolidated and consistent, regardless of what type of inseason action is being considered. This consolidation will likely minimize confusion regarding how NMFS came to a decision, and thereby provide additional transparency to the management process.

Alternative F11, which would eliminate BFT inseason actions, would constrain NMFS' ability to adjust management actions that help spread the maximum utilization of BFT quota over the longest period of time to provide reasonable fishing opportunities. The positive economic aspect of this alternative would be that quota allocations and daily retention limits would remain stable throughout the entire season, which would aid in planning fishing activities.

#### ***6.4.3.2 Timeframe for Annual Management of HMS Fisheries***

Three alternatives were considered for changing the annual management timeframes for HMS fisheries. Alternative G1, maintaining the current fishing year for all HMS species, would not result in any anticipated disruptions to any of the HMS markets.

Alternative G2, which would manage all HMS species on a calendar year cycle, would not have any economic impacts on the shark fishery, since this is the status quo for that fishery. For the bluefin tuna fisheries, the economic impacts of alternative G2 are expected to be minimal given the current measures used to distribute quota throughout the year. The economic impacts to the Atlantic billfish fisheries could vary slightly depending upon whether thresholds for taking restrictive action are achieved and the management measures subsequently implemented. Minor to moderate impacts as a result of the ICCAT billfish landings limit (E6) could be shifted to the tail end of the calendar year, beginning in late summer, under this alternative. This temporal shift in impacts would result in some geographic shift to include New England and Mid-Atlantic regions. If the threshold for implementing catch-and-release-only fishing is achieved to comply with the ICCAT limit, it is estimated that an average of 39 tournaments awarding prizes for marlin occurring from August to December could be impacted, and up to four tournament cancellations could occur resulting in an annual economic impact of \$5,501,756.

Alternative G3, which would establish a June 1 – May 31 fishing year management cycle for all HMS species, could result in some short-term negative economic impacts as shark wholesale and retail markets adjust to the potential disruption in catch rates resulting from the shift to a fishing year and new trimesters.

#### ***6.4.3.3 Authorized Gears***

Seven alternatives have been considered to address issues with authorized gear. Alternative H1, the No Action alternative, would not be expected to have any additional economic impacts because fishermen are already operating under these measures.

Alternative H2, which would authorize speargun fishing gear as a permissible gear-type in the recreational Atlantic BAYS tuna fishery, could have positive economic impacts for spearfishermen. Not allowing BFT to be taken with speargun fishing gear avoids the possibility of further exacerbating quota limited situations in the school size fishery and might avoid gear conflicts with other members of the BFT recreational fleet. It could also increase sales of speargun fishing gear. The charter/headboat sector may also experience positive economic impacts as spearfishermen may increase their use of for-hire vessels.

Alternative H3, which would authorize speargun fishing in both the commercial BAYS tuna handgear and recreational fisheries, would have similar economic impacts to alternative H2 except that there would be potential economic benefits for CHB and General category fishermen from the sale of commercially speared tunas. However, it is not anticipated that many commercial tuna fishermen would utilize this gear type.

Alternative H4 would authorize green-stick gear for the commercial harvest of Atlantic BAYS tunas. This alternative would likely have positive economic impacts for those fishermen who wish to employ green-stick gear to target Atlantic BAYS tunas commercially. The vessels

that would be authorized to use green-stick gear under this alternative would include all permitted Atlantic Tunas Longline, General, and HMS CHB (on non for-hire trips) category vessels, approximately 214, 4,824, and 4,173 vessels, respectively. The higher landing rates and higher quality of meat landed using green-stick gear could provide positive economic impacts to commercial fishermen, as well as benefit fish houses, gear supply houses, and other associated business. The economic benefits of this alternative, however, would likely be small since some vessels are already utilizing this gear type. There could be negative economic impacts from the prohibition on the possession or retention of BFT when possessing commercial configurations of green-stick since this practice may already be occurring. Any increases in green-stock gear sales could produce positive economic benefits to onshore gear suppliers and other onshore businesses.

Alternative H5 would allow the commercial swordfish handgear fishery to continue utilizing unattached handlines, redefined as “buoy gear,” and would likely continue affording positive economic benefits to current fishery participants. If any vessels are currently fishing with buoy gear utilizes more than 35 flotation devices, this alternative could limit effort, and there could be some unquantified adverse economic impacts. This alternative would also require that fishermen using this gear type affix gear monitoring equipment to each buoy to aid in recovery. NMFS anticipates that most swordfish handgear fishermen using unattached handlines likely already possess and utilize some or all of this gear monitoring equipment. If not, minimum compliance costs for the least expensive equipment (*e.g.*, reflective tape and spotlight) could be incurred. Given the change in definition of handlines in alternative I5(b) requiring them to be attached to a vessel, alternative H5 represents a positive economic opportunity for commercial swordfish handgear and directed swordfish limited access permit holders. However, this alternative could result in perceived negative social impacts by recreational fishermen by continuing to allow commercial swordfishing in areas closed to HMS pelagic longline gear.

Alternative H6 is similar to H5, except under alternative H6, each buoy would be allowed to have no more than 15 hooks or gangions attached. This alternative could provide additional positive economic impacts stemming from the ability to increase the number of hooks attached to each buoy gear. Additionally, this alternative would allow vessels in the swordfish handgear fishery to possess and deploy up to 50 flotation devices.

Alternative H7, which would clarify the allowance of hand-held cockpit gears used at boat side for subduing HMS, would likely have positive economic impacts by reducing confusion over the allowance of these gears and increased retention rates for those fishermen who target large HMS and wish to use these secondary gears. The use of these hand-held cockpit gears can be dangerous and lead to costs if injuries occur, but they would help subdue fish and are already being used.

#### **6.4.3.4 Regulatory Housekeeping**

Eleven regulatory housekeeping issues were addressed with several alternatives for each issue. NMFS considered five different alternatives for the first issue, clarifying the definitions of pelagic and bottom longlines. Alternative I1(a), the No Action alternative, would likely produce the fewest additional adverse economic impacts on fishing vessels, though it could result in compliance issues and longer periods of interruption during compliance inspections at sea.



Alternative I1(b), would establish additional restrictions on longline gear in HMS time/area closures by requiring that BLL vessels in closed areas possess no more than 70 commercial fishing floats, and that PLL vessels in BLL closed areas possess at least 71 commercial fishing floats, would not be expected to produce adverse economic impacts. This alternative would potentially impact less than 5 percent of all PLL sets and less than 10 percent of all BLL sets. BLL fishermen would not need to buy more floats to comply with this alternative. However, PLL fishermen who regularly use short lines may need to buy more floats to ensure that they have more than 71 floats. This alternative would also likely improve inspections at sea.

Alternative I1(c), the preferred alternative, would differentiate between PLL and BLL gear based upon the species composition of the catch onboard or landed. A five percent incidental allowance of “indicator” species is higher than the average across five years, and therefore this alternative would not be expected to produce adverse economic impacts. This alternative, however, could adversely impact those longline vessels that regularly target both demersal and pelagic species on the same trip and that fish in closed areas. The time required to conduct an enforcement inspection at sea under this alternative could create an adverse economic impact in terms of lost opportunity cost, and possibly reduce net revenues associated with re-icing the fish and reduced quality of the catch, but it could also have a positive economic impact if these inspections are quicker than under the No Action alternative.

Alternative I1(d), which would require time/depth recorders on all HMS longlines, would result in direct economic costs associated with the purchase of these devices. It is estimated that equipment costs per vessel could be approximately \$1,400 to \$6,500, and there could be costs associated with a loss of efficiency due to attaching the devices to longlines, and downloading and recording the information. Some positive economic benefits could be realized if this alternative would minimize the disruption of enforcement inspections.

Alternative I1(e) would implement HMS longline time/area closures for both pelagic and bottom longline HMS permitted vessels. This alternative is expected to produce the most significant negative economic impacts, primarily on HMS-permitted BLL vessels that would be prohibited from fishing year-round in the DeSoto Canyon and Florida East Coast closed areas, in the Charleston Bump closed area from February 1 through April 30 each year, and in the Northeastern U.S. closed area from June 1 through June 30 each year.

NMFS considered four alternatives for enhancing shark identification. Alternative I2(a), which retains the current regulations, is not expected to result in economic impacts in the short-term. In the long-term, data issues resulting from poor shark identification could result in less than optimal fishery management.

Under alternative I2(b), fishermen could experience, in the short-term, some adverse economic impacts associated with keeping the second dorsal and anal fins on the shark. In the long-term, the improved quota monitoring and stock assessment data as a result of this alternative could result in a larger quota, and therefore larger net revenues for both fishermen and dealers. Alternative I2(c) is similar, but would allow fishermen to remove all the fins of lemon

and nurse sharks while at sea. Since so few lemon and nurse sharks are landed, NMFS believes that any economic benefits gained would be marginal.

Alternative I2(d), which would require all fins to remain on all sharks through landing, would have the largest economic impact of any of the shark identification alternatives. It is unlikely that the ex-vessel price of the fins that were packed in ice with the rest of the shark would be as high as the fins that had begun to dry if they were removed. Additionally, if the shark cannot be packed in ice properly due to maintaining the fin on the shark, the quality of the meat, and therefore its value, could also decrease.

NMFS considered three alternatives for addressing compliance with HMS retention limits. Under alternative I3(a), the No Action alternative, individual vessel owner/operators, and/or dealers may experience some positive economic benefits from the sale or purchase of HMS exceeding the commercial retention limits; however, there would be economic impacts from noncompliance with retention limits. Under I3(b) and I3(c) it would be illegal to purchase or sell any HMS from an individual vessel in excess of the retention limits, and therefore there could be slightly less revenue by vessels exceeding the retention limits. However, there would be slightly positive economic impacts with enhanced compliance with the retention limits, but there may be increased dealer administrative/information costs with insuring that they are not purchasing more than the commercial retention limits from a particular vessel.

NMFS considered two alternatives for defining the Florida East Coast closed area. The No Action alternative I4(a) would not result in any additional economic impacts. Alternative I4(b) would extend the closed area and could potentially reduce HMS catches and associated landings revenues by a small amount. This is not expected to be significant given the limited number of vessels that fished in that area in recent years.

NMFS considered five alternatives for revising the definition of handline. Alternative I5(a), which would retain the current definition, would not add any additional economic impacts. Alternative I5(b), which would amend the definition of “handline” by requiring that they remain attached to all vessels, would potentially impact a large portion of HMS permit holders and result in negative economic impacts by potentially reducing operational efficiency. However, this practice does not appear to be widespread and is likely limited to recreational swordfish activity. Alternative I5(c), which would require handlines remain attached to all vessel when fishing recreationally, could impact recreational fishing activity but there is currently no data indicating how many recreational vessels are fishing this way.

Alternative I6(a) and I6(b) focus on clarifying the recreational nature of the billfish fishery. Neither the No Action alternative (I6(a)) nor the alternative to prohibit the possession of taking of billfish by commercial permit holders (I6(b)) would be expected to have any adverse economic impacts since Atlantic billfish cannot be bought or sold by commercial vessels. There could be some positive economic impacts to the recreational fishing community if alternative I6(b) results in enhanced fishing opportunities for recreational fishermen.

NMFS considered three alternatives for BFT dealer reporting. Alternative I7(a), the No Action alternative, would not change the current economic impacts of reporting, but it could

continue to impose time costs associated with the entry of similar data on several different forms for reporting. Alternative I7(b) would allow the option to do one-stop data entry on the Internet, and thus provide flexibility that could reduce economic impacts associated with reporting. Alternative I7(c) would require most dealers to use electronic reporting, which might benefit some, but could also impose additional Internet access costs and training costs in learning the new system.

Alternatives to address no fishing and cost-earnings reporting forms (I8(a-c)) clarify the current practices in submitting these forms and are not likely to increase economic costs associated with these activities. However, the clarification of the timeframes involved for submitting reports may result in fewer permit renewal delays.

Maintaining the current non-tournament recreational landings reporting requirements for North Atlantic swordfish and Atlantic billfish under alternative I9(a) would not result in any significant economic impacts. Alternative I9(b), which would require vessel owners to report non-tournament recreational landing, would not cause any significant adverse economic impacts since 95 percent of past reports were reported by vessel owners. Linking non-reporting to permit sanctions would enhance enforcement and compliance that is expected to improve recreational data collection. In addition, the overall number of calls needed to report landings might be reduced if operators report landings for several anglers' landings.

Under the No Action alternative I10(a), status quo regulatory text would remain unchanged and the applicability of quota carry-over provisions to this set-aside quota would not be clarified. Under this alternative, unharvested quota from the set-aside would be rolled-over to subsequent fishing years, and thus would provide a potential positive economic impact. There may be a perceived negative economic impact among other fishery sectors if they were to close after achieving their allocated quota and were unable to access available quota, via in-season transfers, from the NED set-aside. Alternative I10(b) would amend the regulatory text to clarify that carry-over provisions apply to this specific set-aside and therefore would also allow unharvested quota from the set-aside to be rolled-over to subsequent fishing years, and thus provide a potential positive economic impact. Again, there may be a perceived negative economic impact among other fishery sectors if they are closed after achieving their allocated quota and are unable to access available quota, via in-season transfers, from the NED set-aside. Alternative I10(c) would conduct additional discussions at ICCAT regarding the long-term implications of allowing unused BFT quota from the previous year being added to the subsequent year's allocation. Depending on the results these discussions the regulations and operation procedures may need to be further amended in the future. In the interim, NMFS would maintain the current regulatory text, but would amend the practice of allowing under/overharvest of this set-aside allocation to be rolled into, or deducted from, the subsequent fishing year's set-aside allocation. Therefore, regardless of the amount of the set-aside harvested or unused in a given year, the balance would return to 25 mt (ww) at the start of each fishing year. This alternative would be expected to have some negative economic impacts as it would not allow for the potential economic gain attributed to quota being carried forward from the preceding fishing year.

Alternatives I11(a-b) examine whether or not recreational vessels with Federal permits should be required to abide by Federal regulations regardless of where they are fishing, unless a state has more restrictive regulations. If Federal regulations always apply unless state regulations are more restrictive, as in alternative I11(b), there could be some decreases in recreational satisfaction as a result of potentially increasing regulatory requirements to the Federal standards.

## CHAPTER 6 REFERENCES

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